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MONTANA WATER SUPPLY OUTLOOK

Snowpack and Streamflow
Forecasts as of

June 1, 1983

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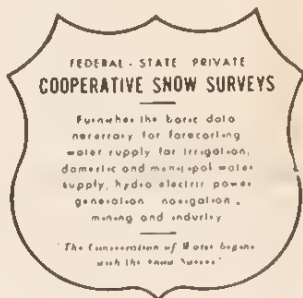
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The Montana Water Supply Outlook is a publication of the U.S. Soil Conservation Service. The SCS administers the Cooperative Snow Survey Program in cooperation with other federal, state and private agencies, organizations, and individuals.

The report is prepared by SCS, Snow Survey and Water Supply Forecast Staff, P.O. Box 98, Bozeman, Montana.



WARM TEMPERATURES INCREASE SNOWMELT

The last half of May was quite warm. Substantial snowmelt occurred at all elevations with a resultant increase in streamflows.

Moisture has been below average in most areas allowing the snowmelt water to travel downstream within the stream banks. Most irrigation reservoirs are full or nearly full. Irrigation has begun in most areas because of warm temperatures and lack of rainfall.

Most low elevation snow has melted. Most high elevation snowpacks have lost about one-half of the water content that was accumulated through the winter.

With the peak snowmelt runoff occurring a little sooner than usual and the below average snowpack in most drainages, mid and late season shortages of irrigation water supplies are still expected to occur in most central Montana drainages and upper drainages in the Clark Fork Basin west of the Divide.

ACID PRECIPITATION MEASUREMENTS

Montana snow surveyors continued to obtain surface snow pH measurements this season. This is the third winter these measurements have been taken. The area of low pH, commonly referred to as "acid precipitation", extends further north than in previous seasons. Southwest Montana continues to show snowfall of less than 5.0 pH except for the Bitterroot area. The last two seasons, the Bitterroot has had low pH snow but this season it appears to be more normal. The shape of this year's low pH zone may be associated with differing storm patterns this winter.

The heavy precipitation areas were mostly south of Montana with the southwest corner of the State receiving much of its moisture from the edges of these storms. It appears from the last 3 year's data, that the low pH snowfall is being brought in from the area southwest of the State and is not directly related to activity in Montana. No decision has been made regarding pH monitoring next year. If measurements are discontinued, a summary report showing all past data will be published. Otherwise, a summary report will be prepared with the termination of pH measurements.



SNOWFALL pH STUDY
WINTER 1982-83
SCS SNOW SURVEY
BOZEMAN, MONTANA

SNOW		June 1, 1983		THIS YEAR			PAST RECORD	
DRAINAGE BASIN and/or SNOW COURSE		Elevation	Date of Survey	Snow Depth (Inches)	Water Content (Inches)	Water Content (Inches)		
NAME	Last Year					Average		
ARCH FALLS	7350	5/27	25	9.2	-	10.2		
BADGER PASS	6900	6/01	35	18.6	50.3	41.3		
BADGER PASS PILLOW	6900	6/01	SP	14.5	43.5	-		
BANFIELD MOUNTAIN	5600	5/25	21	12.0	16.3	7.6		
BANFIELD MOUNTAIN PILLOW	5600	5/25	SP	9.9	11.6	4.2		
BARKER LAKES PILLOW	8250	6/01	SP	15.2	18.8	-		
BASIN CREEK PILLOW	7180	6/01	SP	6.6	14.2	-		
BEAGLE SPRINGS PILLOW	8850	6/01	SP	1.0	4.7	-		
BIG COULEE	5100	5/27	0	.0	-	0.5		
BIG CREEK	6750	6/01	84	44.8	49.2	44.3		
BLACK BEAR PILLOW	7950	6/01	SP	29.9	37.7	30.1		
BLACK PINE	7100	5/25	17	7.0	10.4	4.1		
BLACK PINE PILLOW	7100	5/25	SP	7.4	10.7	4.4		
BLOODY DICK PILLOW	7600	6/01	SP	.0	7.5	-		
BLUE LAKE	5900	6/01	0	.0	22.8	14.7		
BOULDER MOUNTAIN PILLOW	7950	6/01	SP	13.7	23.0	-		
BOX CANYON PILLOW	6670	6/01	SP	.0	.0	-		
BRIDGER BOWL	7250	5/31	40	18.4	23.7	23.6		
BRIDGER BOWL PILLOW	7250	5/31	SP	16.5	25.4	19.8		
CALVERT CREEK PILLOW	6450	6/01	SP	.0	.0	0.0		
CASHE CREEK PILLOW	7800	6/01	SP	2.0	5.0	-		
CHICKEN CREEK	4060	6/01	0	.0	.0	-		
CLOVER MEADOW PILLOW	8600	6/01	SP	10.8	18.3	-		
COLE CREEK	7850	5/26	66	27.4	15.2	19.5		
COLE CREEK PILLOW	7850	5/26	SP	27.2	13.1	18.6		
COMBINATION	5600	5/26	0	.0	1.6	0.0		
COMBINATION PILLOW	5600	5/26	SP	.2	.0	0.0		
COPPER BOTTOM PILLOW	5200	6/01	SP	.0	.0	0.0		
COPPER CAMP PILLOW	6950	6/01	SP	10.2	34.5	19.1		
COYOTE HILL	4200	5/31	0	.0	-	-		
CRYSTAL LAKE PILLOW	6100	6/01	SP	.0	5.9	-		
DALY CREEK PILLOW	5780	6/01	SP	.0	.0	-		
DARKHORSE LAKE PILLOW	8600	6/01	SP	18.7	35.3	-		
DEADMAN CREEK	6450	5/26	0	.0	1.4	0.4		
DEADMAN CREEK PILLOW	6450	5/26	SP	.0	1.3	0.0		
DESERT MOUNTAIN	5600	5/25	4	2.0	3.2	1.4		
DEVILS SLIDE	8100	5/27	67	27.1	-	25.5		
DIVIDE PILLOW	7900	6/01	SP	.9	7.0	1.0		
EMERY CREEK	4350	5/25	0	.0	.0	-		
EMERY CREEK PILLOW	4350	5/25	SP	.0	.0	-		
FATTY CREEK	5500	6/01	15	8.0	14.6	9.1		
FISHER CREEK PILLOW	9100	6/01	SP	28.0	41.0	38.0		
FLATTOP MOUNTAIN PILLOW	6300	6/01	SP	33.5	42.6	48.0		
FOURTH OF JULY	3450	5/27	0	.0	.0	-		
FRIDAY HILL	4620	5/27	0	.0	.0	-		
ERHNER MEADOWS PILLOW	6480	6/01	SP	.0	4.0	3.1		
GARVER CREEK	4250	5/25	0	.0	.0	0.1		
GARVER CREEK PILLOW	4250	5/25	SP	.0	0.3	0.0		
GIBBONS PASS	7100	5/31	17	8.5	-	11.2		
GRAVE CREEK	4300	5/25	0	.0	.0	2.1		
GRAVE CREEK PILLOW	4300	5/25	SP	.0	.0	0.0		

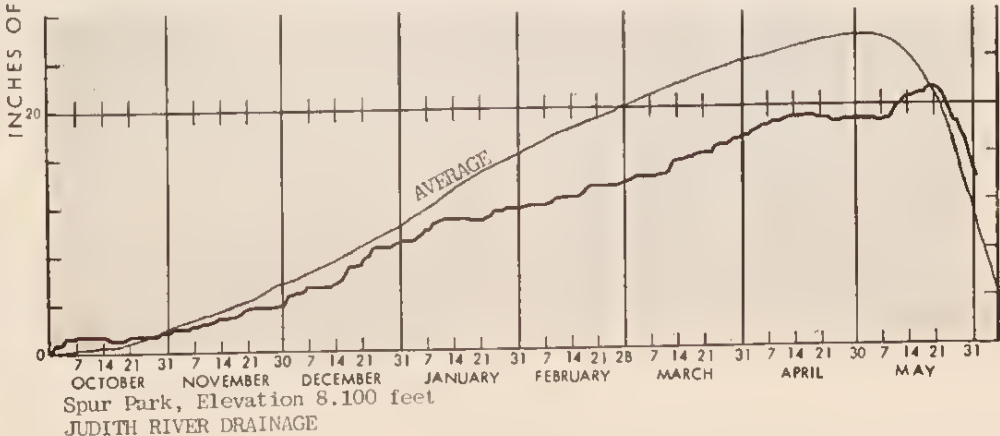
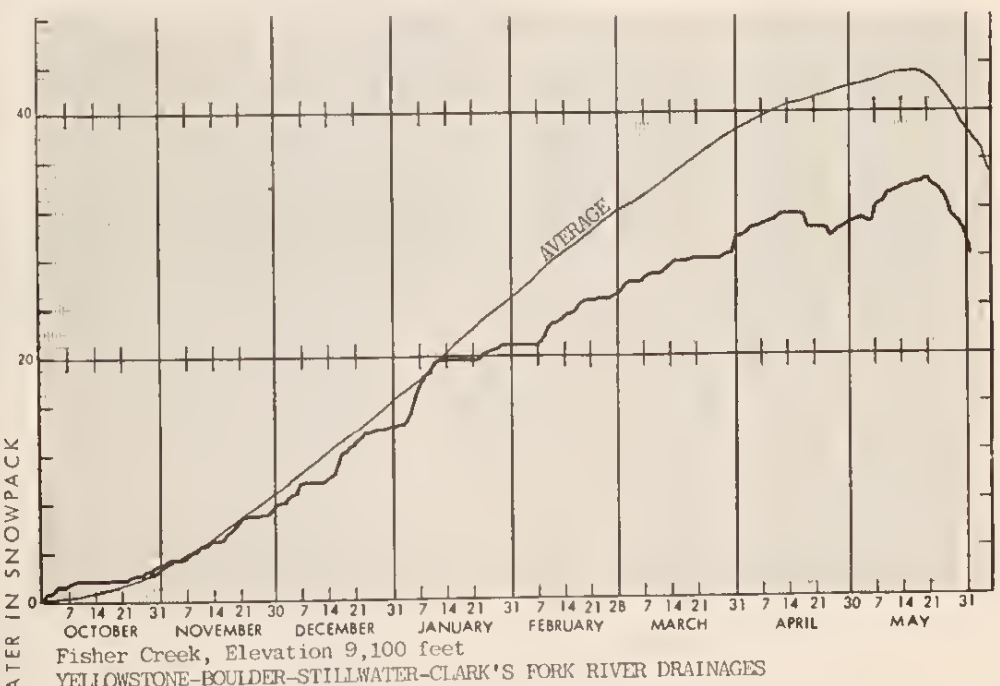
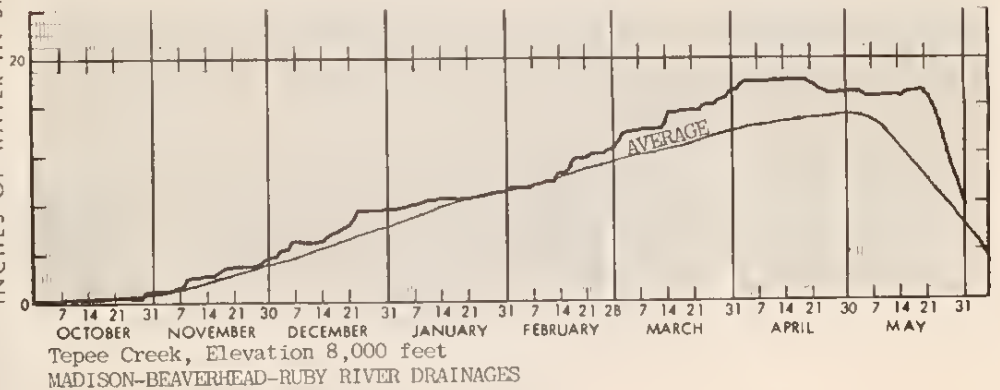
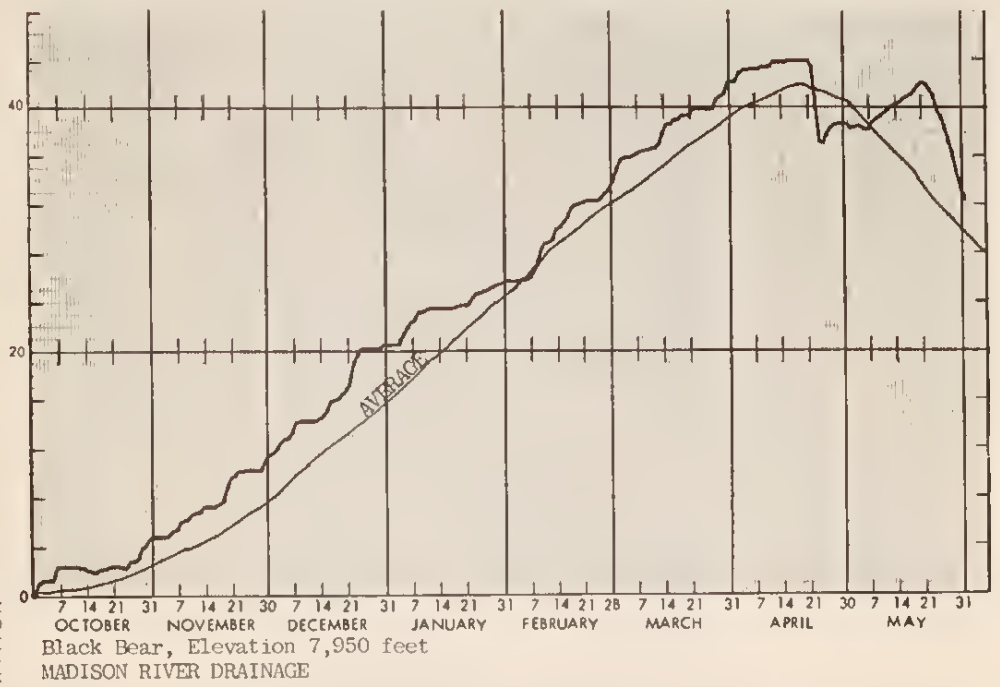
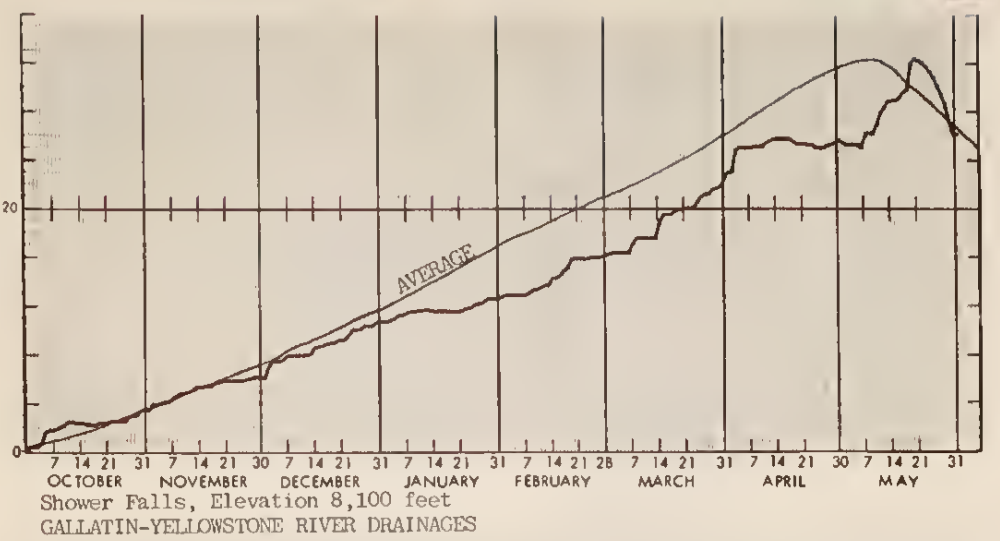
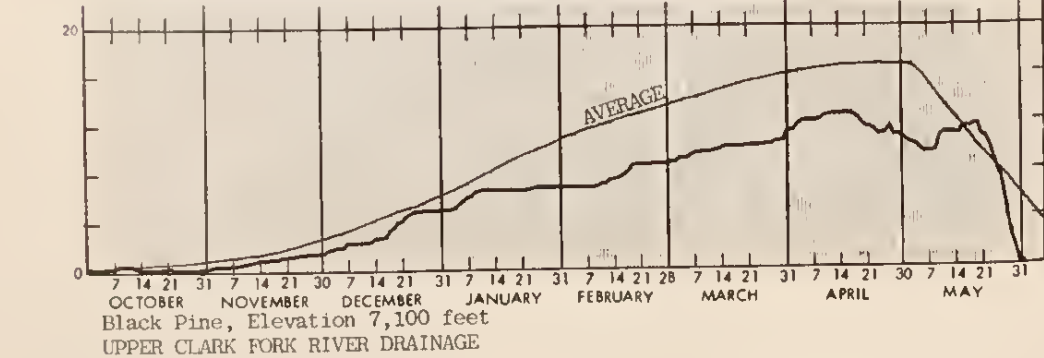
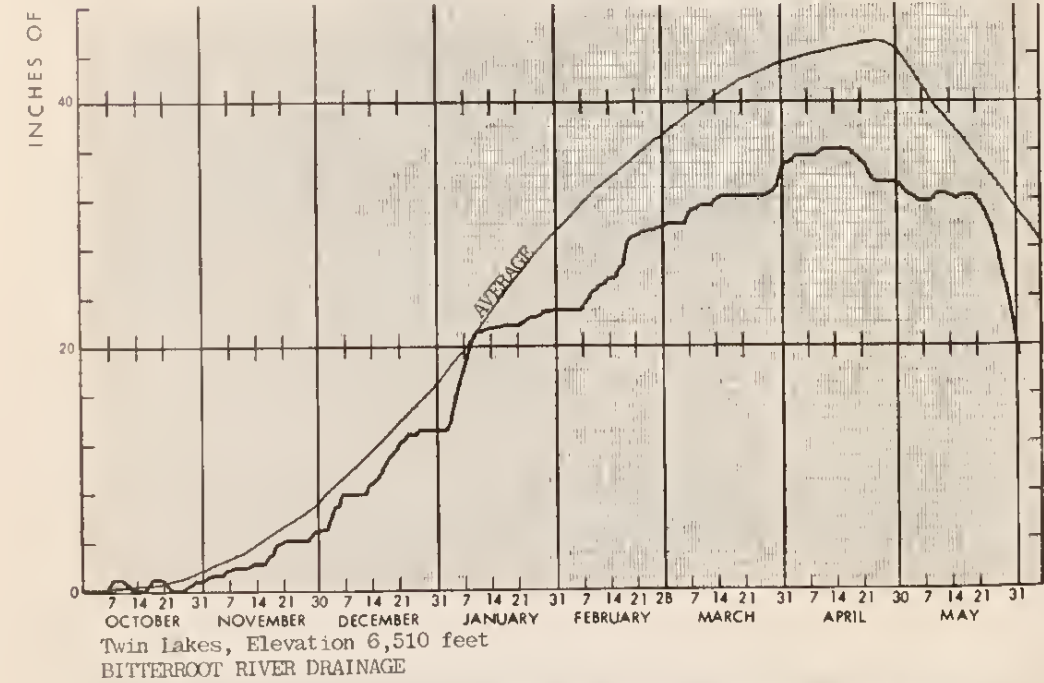
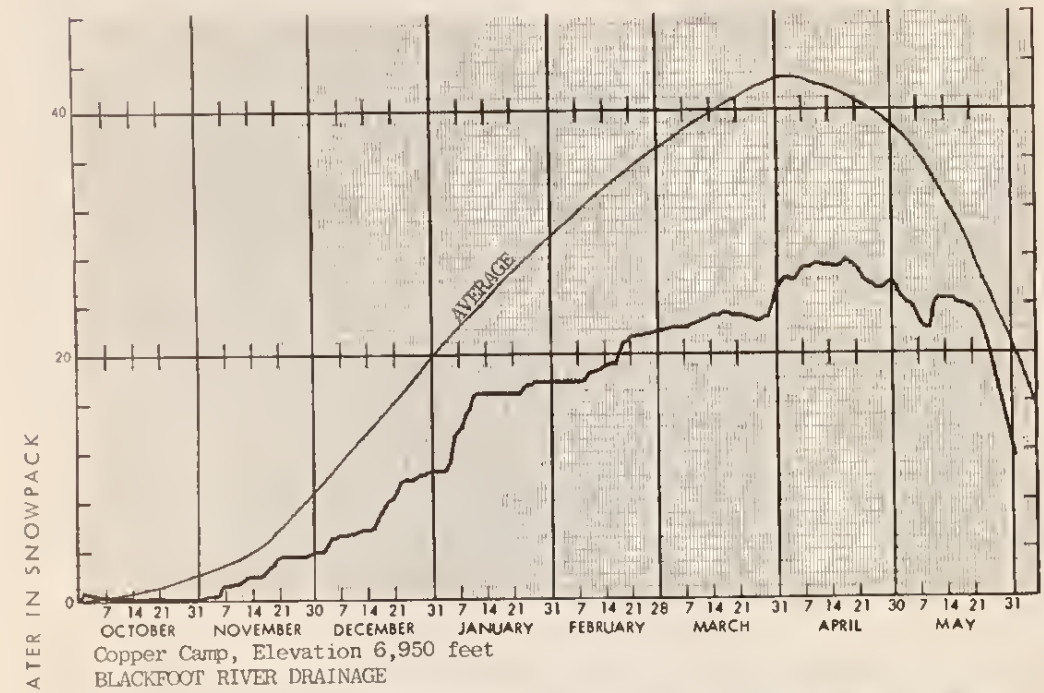
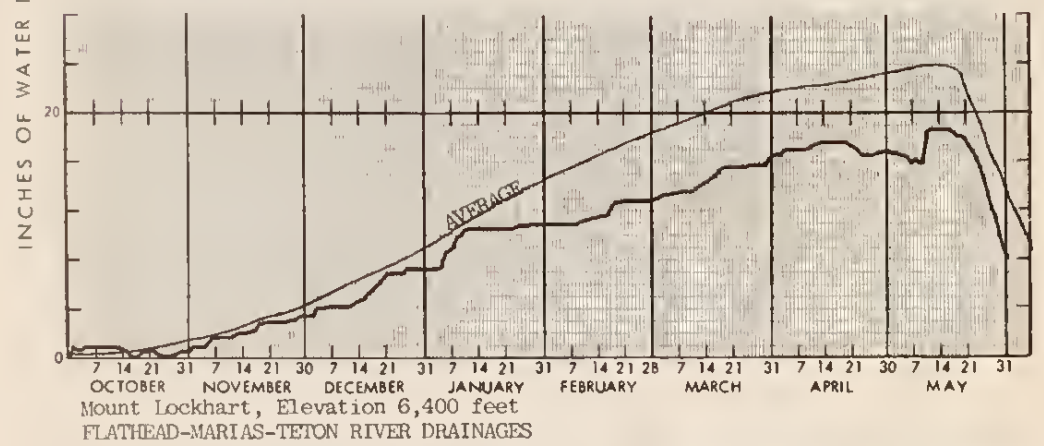
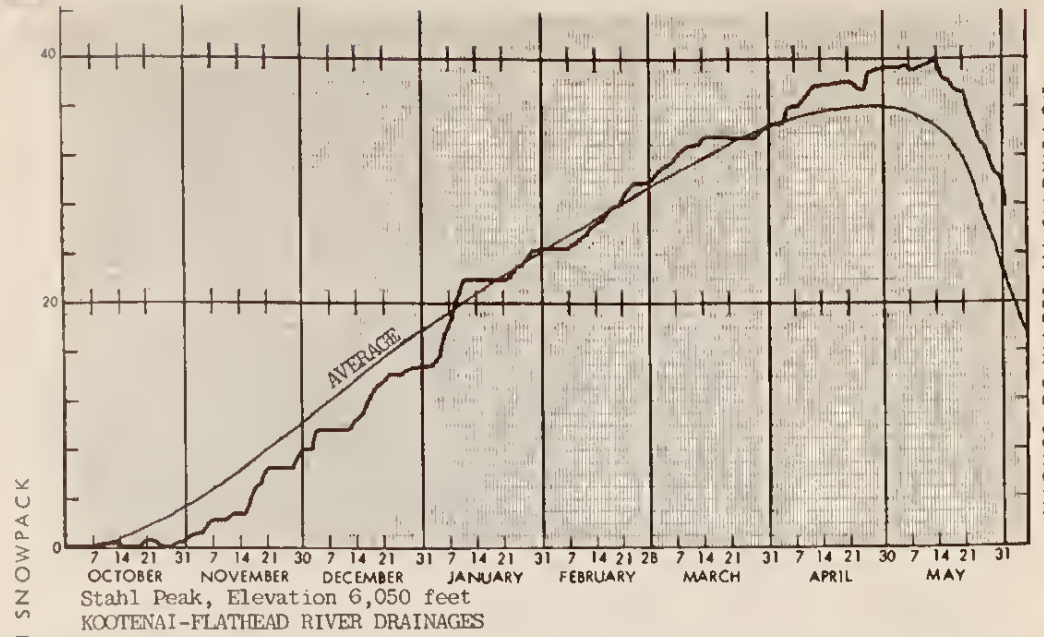
SNOW		June 1, 1983		THIS YEAR			PAST RECORD	
DRAINAGE BASIN and/or SNOW COURSE		Elevation	Date of Survey	Snow Depth (Inches)	Water Content (Inches)	Water Content (Inches)		
NAME						Last Year	Average	
SHOWER FALLS PILLOW	8100	6/01	SP	25.3	28.2	26.2		
SILVER RUN	6630	5/26	0	.0	-	1.6		
SILVER RUN PILLOW	6630	5/26	SP	.0	.0	-		
SKALKAKO SUMMIT	7260	5/25	44	19.4	29.8	16.6		
SKALKAKO SUMMIT PILLOW	7260	6/01	SP	16.0	30.0	-		
SKYLARK TRAIL PILLOW	6200	6/01	SP	10.8	32.1	-		
SOUTH FORK SHIELDS	8100	6/02	51	22.5	-	-		
SOUTH FORK SHIELDS PILLOW	8100	6/02	SP	16.2	-	-		
SPOTTED BEAR MOUNTAIN	7000	6/01	0	.0	.3	1.2		
SPUR PARK	8100	5/26	40	16.4	26.2	18.8		
SPUR PARK PILLOW	8100	5/26	SP	18.6	27.2	18.2		
STAHL PEAK	6050	5/25	75	38.6	35.8	35.8		
STAHL PEAK PILLOW	6050	5/25	SP	33.1	31.3	30.2		
STRYKER BASIN	6180	6/01	39	21.5	32.5	-		
STUART MOUNTAIN	7400	5/29	48	23.0	26.5	20.2		
TEPEE CREEK	8000	5/31	32	14.0	-	11.9		
TEPEE CREEK PILLOW	8000	5/31	SP	8.2	12.2	5.3		
TRINKUS LAKE	6100	6/01	38	21.4	34.9	27.0		
TV MOUNTAIN	6800	5/29	16	7.3	13.1	11.3		
TWELVEMILE CREEK PILLOW	5600	6/01	SP	.0	.0	0.9		
TWIN LAKES PILLOW	6510	6/01	SP	18.9	48.0	30.7		
UPPER HOLLAND LAKE	6200	5/29	31	15.0	25.9	24.8		
WALDRON	5600	6/01	0	.0	-	0.0		
WALDRON PILLOW	5600	6/01	SP	.0	.0	0.2		
WARM SPRINGS PILLOW	7800	6/01	SP	18.7	27.7	-		
WEASEL DIVIDE	5450	5/25	45	23.2	26.1	20.6		
WHISKEY CREEK PILLOW	6800	6/01	SP	.0	4.1	1.7		
WHITE MILL PILLOW	8700	6/01	SP	19.1	30.5	21.0		
WOOD CREEK PILLOW	5960	6/01	SP	.0	.0	-		

Unpublished data and corrections to
previously published data

Bear Paw Ski Area	5200	2/17	13	3.0	--	--
Boxelder Creek	5100	2/14	18	4.8	--	--
Hoodoo Basin	6000	2/15	99	35.5	40.5	
Hoodoo Creek	5900	2/15	94	33.0	36.6	--

Average based on 1963-77 period. A - Aerial observation; water content estimated. SP - Snow Pillow observations; water content only. * Estimated from SNOTEL.

SNOW PILLOW DATA



RESERVOIR STORAGE (Thousand Acre Feet) END OF MONTH May 31, 1983

BASIN OF STREAM		RESERVOIR	Usable Capacity	Usable Storage			
				This Year	Last Year	Average	
COLUMBIA							
Kootenai	Koocanusa	5,748.2	3,427.0	2,659.0	---	---	
Flathead	Hungry Horse	3,451.0	2,879.0	2,476.0	2,523.0	---	
	Flathead Lake	1,791.0	1,489.0	1,321.0	1,440.0	---	
	Camas (4)	45.2	38.4	38.1	30.8	---	
	Mission Valley (8)	100.3	85.0	53.5	59.4	---	
	Clark Fork	Georgetown Lake	31.0	26.8	26.4	25.8	
	Lower Willow Creek	4.9	5.0	5.1	4.1	---	
	Nevada Creek	12.6	12.9	12.8	11.1	---	
	Noxon Rapids	334.6	328.3	323.9	257.0	---	
	Bitterroot	Painted Rocks	31.7	---	---	29.4	
	Como	34.9	---	---	26.3	---	
MISSOURI							
Beaverhead	Lima	84.0	68.4	78.5	68.1	---	
	Clark Canyon	257.2	180.3	189.6	159.0	---	
Ruby	Ruby	38.8	38.8	---	38.2	---	
Madison	Hebgen Lake	377.5	263.4	294.3	300.3	---	
	Ennis Lake	41.0	38.5	33.8	35.3	---	
Gallatin	Middle Creek	8.0	7.2	6.5	6.5	---	
Missouri	Canyon Ferry	2,043.0	1,675.0	1,629.0	1,625.0	---	
	Hauser & Helena	61.9	63.0	63.0	60.0	---	
	Lake Helena	10.4	10.9	10.9	9.8	---	
	Holter Lake	81.9	80.0	71.2	77.0	---	
	Fort Peck Lake	18,910.0	16,200.0	14,610.0	16,240.0	---	
	Smith	Smith River	10.6	11.6	16.6	10.9	---
		Newlan Creek	12.4	9.6	11.7	---	---
Musselshell	Sair	7.0	7.1	7.1	6.7	---	
	Martinsdale	23.1	21.2	16.6	18.1	---	
	Deadman's Basin	72.2	---	69.2	59.1	---	
	Sun	Gibson	99.1	92.3	81.6	90.4	---
	Willow Creek	32.2	26.2	8.2	28.3	---	
	Pishkun	32.0	30.4	30.6	30.3	---	
	Marias	Lower Two Medicine	11.9	---	---	12.9	---
		Four Horns	19.2	---	---	12.9	---
		Swift	30.0	28.2	15.9	25.0	---
Milk	Lake Frances	111.9	89.0	100.5	87.0	---	
	Elwell (Tiber)	1,347.0	772.6	683.2	642.7	---	
	Beaver Creek	3.5	3.2	3.2	3.1	---	
	Fresno	127.2	48.8	127.5	100.6	---	
	Nelson	66.8	46.3	58.0	46.6	---	
HUDSON BAY							
St. Mary's	Lake Sherburne	64.3	22.6	8.7	31.2	---	
YELLOWSTONE							
Stillwater	Mystic Lake	21.0	2.7	2.1	5.4	---	
Clark's Fork	Cooney	27.4	21.8	16.5	19.4	---	
Tongue	Tongue River	68.0	39.1	27.4	47.8	---	
Bighorn	Bighorn Lake	1,356.0	896.5	775.3	635.7	---	

NEW AVERAGES NEXT YEAR

Next year, a new base period will be used to compute averages for comparing current snow water equivalent, precipitation, stream-flow reservoir storages, and other hydrologic and climatic indicators. The 20-year period 1961-1980 will become the new base period effective for the 1984 Water Year (WY) which begins on October 1, 1983. In WY 1988, the 1961-1985 period will be used for a 25-year base period. In 1993 WY, a full 30-year period (1961-1990) will be used. After 1993, the averages will be based on a 30-year period and will be updated every 10 years. These changes are being made to become more compatible with other agencies and organizations involved in hydrologic and climatic data collection and reporting.



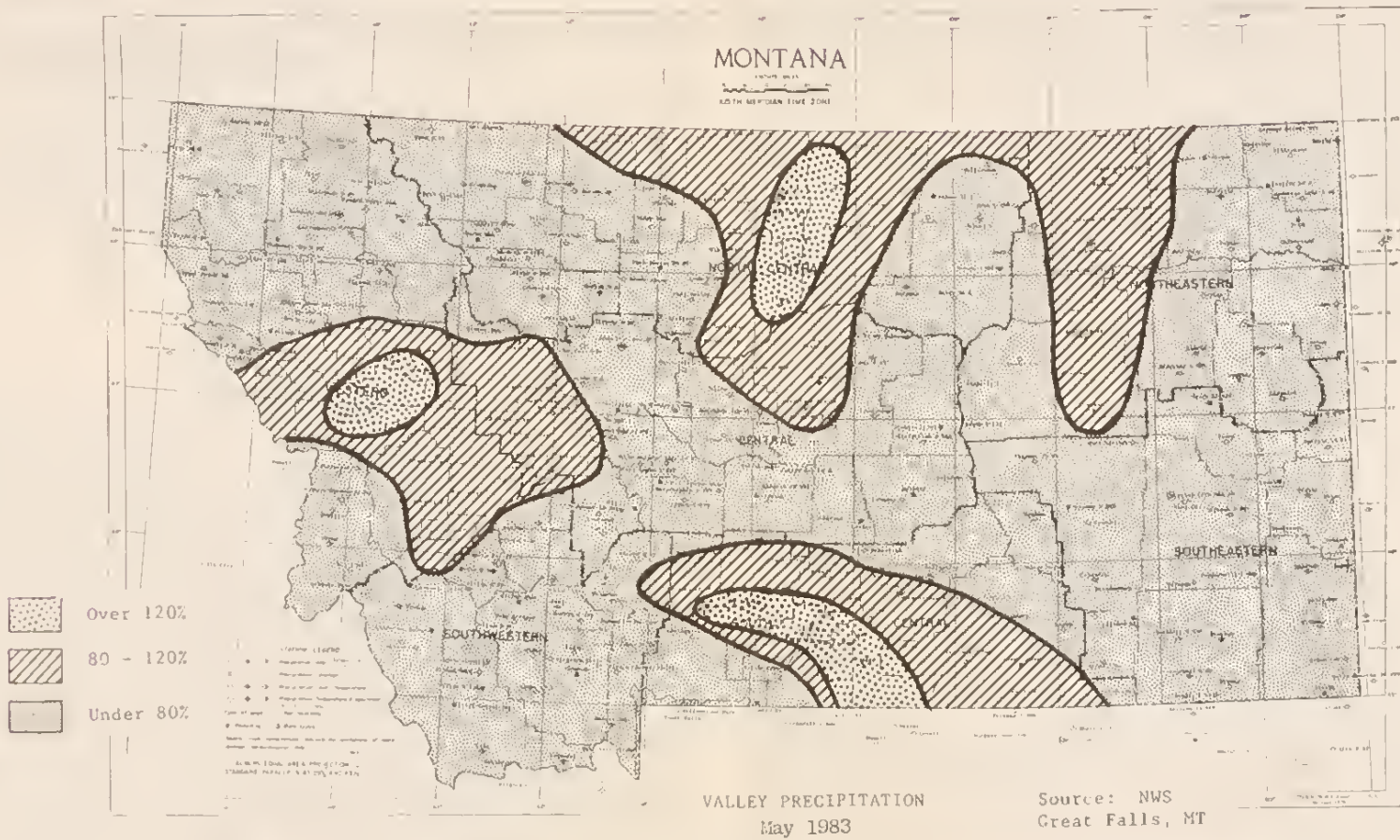
PEAK SNOWMELT RUNOFF

Warm temperatures near the end of May have induced considerable snowmelt and fairly rapid response in streamflows.

The peak had already occurred on many lower elevation headwater streams prior to this heavy melt period. The Madison and Big Hole Rivers in southwest Montana, and the Clark Fork, Blackfoot, Bitterroot, and North and Middle Forks of the Flathead, west of the Divide, had their peak snowmelt runoff at the end of May. The Clark Fork, Bitterroot and Middle Fork of the Flathead, peaked slightly higher than estimated on May 1 but all other streams had peak flows in the range forecasted. The Missouri River inflow to Canyon Ferry Reservoir should reach its peak inflow on the first or second of June.

The Gallatin River, the Yellowstone River, and its tributaries should reach their peak runoff around the 7th to 10th of June, unless cool weather postpones the melt period.

So far, precipitation has been light during peak snowmelt runoff and runoff has stayed within the stream channels.



AGENCIES AND ORGANIZATIONS COOPERATING IN MONTANA SNOW SURVEYS

GOVERNMENT AGENCIES

Canada

- Department of the Environment
- Atmospheric Environment Service
- Water Management Service
- British Columbia Ministry of Environment
- Inventory and Engineering Branch, Hydrology Section
- Alberta Environment
- Technical Services Division

Federal

- Department of the Army - Corps of Engineers
- Department of Agriculture - Forest Service
- Department of Commerce - National Environmental Satellite Service
- Department of Interior - National Weather Service
- Department of Interior - Bureau of Indian Affairs
- Department of Interior - Fish and Wildlife Service
- Department of Interior - Geological Survey
- Department of Interior - National Park Service
- Department of Interior - Bureau of Reclamation
- Department of Energy - Bonneville Power Administration

STATE AGENCIES

- Montana Conservation Districts
- Montana Department of Fish, Wildlife and Parks
- Montana Department of Natural Resources and Conservation
- Montana State University - Agricultural Experiment Station
- University of Montana - School of Forestry

PRIVATE ORGANIZATIONS

- The Anaconda Company
- Big Sky of Montana
- Butte Water Company
- Flathead Valley Community College
- Montana Power Company

Other organizations and individuals furnish valuable information for snow survey reports. Their cooperation is gratefully acknowledged.